

# Claims

- [c1] A method for reformatting binary image data, comprising:
- converting binary image data into gray scale image data;
  - segmenting gray scale image data into a first plane having high spatial frequency gray scale image data and a second plane having low spatial frequency gray scale image data; and
  - separately compressing the high spatial frequency gray scale image data in the first plane and the low spatial frequency gray scale image data in the second plane.
- [c2] The method of claim 1, wherein segmenting gray scale image data includes segmenting the high spatial frequency gray scale image data into a plurality of planes based on gray scale levels of the high spatial frequency gray scale image data.
- [c3] The method of claim 1, further comprising:
- enhancing the low spatial frequency gray scale image data in the second plane.

- [c4] A computer readable medium or a modulated signal being encoded to perform the method of claim 1.
- [c5] A method for reformatting binary image data, comprising:
- segmenting binary image data to generate text binary image data in a first plane;
  - subtracting the text binary image data from binary image data to generate non-text binary image data in a second plane;
  - converting the non-text binary image data in the second plane into non-text gray scale image data in the second plane; and
  - separately compressing the text binary image data in the first plane and the non-text gray scale image data in the second plane.
- [c6] The method of claim 5, further comprising:
- removing speckle noise from the text binary image data in the first plane.
- [c7] The method of claim 5, further comprising:
- enhancing the non-text gray scale image data in the second plane.
- [c8] A computer readable medium or a modulated signal being encoded to perform the method of claim 5.

- [c9] An apparatus to reformat binary image data, comprising:  
a converter to convert binary image data into gray scale image data;  
a segmentor to segment gray scale image data into high spatial frequency gray scale image data in a first plane and low spatial frequency gray scale image data in a second plane;  
a first compressor to compress the high spatial frequency gray scale image data in the first plane; and  
a second compressor to compress the low spatial frequency gray scale image data in the second plane.
- [c10] The apparatus of claim 9, wherein the segmentor segments the high spatial frequency gray scale image data into a plurality of planes based on gray scale levels of the high spatial frequency gray scale image data.
- [c11] The apparatus of claim 9, further comprising:  
a filter to enhance the low spatial frequency gray scale image data in the second plane.
- [c12] A marking device incorporating the apparatus of claim 9.
- [c13] A digital photocopier incorporating the apparatus of claim 9.
- [c14] A stand alone document scanner or a multifunctional de-

vice incorporating the apparatus of claim 9.

- [c15] An apparatus to reformat binary image data, comprising:
  - a segmentor to segment text binary image data to a first plane;
  - a subtractor to subtract text binary image from binary image data to generate a non-text binary image data in a second plane;
  - a converter to convert non-text binary image data in the second plane into non-text gray scale image data in the second plane;
  - a first compressor to compress the text gray scale image data in the first plane; and
  - a second compressor to compress the non-text gray scale image in the second plane.
- [c16] The apparatus of claim 15, further comprising:
  - a first filter to remove speckle noise from the text binary image data in the first plane.
- [c17] The apparatus of claim 15, further comprising:
  - a second filter to enhance the non-text gray scale image data in the second plane.
- [c18] A marking device incorporating the apparatus of claim 15.
- [c19] A digital photocopier incorporating the apparatus of

claim 15.

[c20] A stand alone document scanner or a multifunctional device incorporating the apparatus of claim 15.